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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/779,437	02/09/2001	Alfred A. Barney	01997-286001	6675

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EXAMINER	
JAGAN, MIRELLYS	
ART UNIT	**PAPER NUMBER**
2859	

DATE MAILED: 03/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/779,437	Applicant(s) BARNEY ET AL.	
	Examiner Mirellys Jagan	Art Unit 2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 December 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,6-17,20-26 and 29-48* is/are pending in the application.

4a) Of the above claim(s) ______ is/are withdrawn from consideration.

5)☐ Claim(s) ______ is/are allowed.

6)☒ Claim(s) *1-3, 6-17, 20-26, 29-48* is/are rejected.

7)☐ Claim(s) ______ is/are objected to.

8)☐ Claim(s) ______ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on ______ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. ______.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date ______.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. ______.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: ______.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-3, 6, 7, 9-17, 20, 22-26, 30-36, and 38-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,341,676 to Gouterman et al [hereinafter Gouterman] in view of Huston and Bawendi.

Referring to claims 1-3, 6, 7, 9-14, and 48, Gouterman discloses a method of sensing temperature comprising the steps of:

providing a temperature sensor comprising a matrix formed of a fluorescent material (B) in an inorganic polymer binder on the surface of a substrate;

irradiating a portion of the sensor with an excitation wavelength of light from a light source;

detecting the emission intensity of light from the sensor using a detector; and

determining an unknown temperature of the surface directly from the emission intensity of light from the sensor (see column 7, lines 12-25 and 48-53; column 8, lines 28-30, 39-41; column 8, line 61-column 9, line 1; column 9, lines 42-49; column 9, line 60-column 10, line 6; and column 11, lines 7-22).

Gouterman does not disclose the fluorescent material being a group II-VI, III-V, or IV semiconductor nanocrystal from the claimed group of nanocrystals; the nanocrystal having a second semiconductor nanocrystal overcoated thereon; the nanocrystal including an organic or organometallic overlayer including a metal alkoxide as a hydrolyzable moiety to make the nanocrystal soluble in the binder; the nanocrystal being a member of a substantially monodisperse core population that emits light in a spectral range of no greater than 75nm at FWHM, exhibits less than a 15% rms deviation in diameter with a particle size in the range of about 15-125 Å, and photoluminesces with a quantum efficiency of at least 10%.

Huston discloses a temperature sensor comprising a semiconductor nanocrystal. Huston teaches that semiconductor nanocrystals are luminescent when irradiated with light and are useful for sensing temperature.

Bawendi discloses a fluorescent material comprising a semiconductor nanocrystal that is luminescent when irradiated with an excitation wavelength of light. The semiconductor nanocrystal includes a semiconductor, such as CdS, CdSe, or CdTe surrounded by an overcoat of a second semiconductor material. A coat of an organic or inorganic overlayer surrounds the nanocrystal, the overlayer having a polymerizable moiety that has an affinity for the nanocrystal surface and a chosen binder such as an inorganic or organic polymer. The overlayer is used to convey solubility in order to disperse the coated nanocrystal into the chosen binder. The semiconductor nanocrystal is a member of a monodisperse core population that emits light in a spectral range of no greater than 75nm at FWHM, exhibits less than a 15% rms deviation in diameter with a particle size in the range of about 15-125 Å, and photoluminesces with a quantum efficiency of at least 10%. Bawendi teaches that the semiconductor nanocrystal is a

highly luminescent material when irradiated with light (column 2, line 47-column 3, line 9, and column 10, line 64-column 11, line 3).

Referring to claims 1 and 48, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method disclosed by Gouterman by replacing the fluorescent material with an inorganic polymer-soluble fluorescent material, as taught by Bawendi, in order to provide a fluorescent material that is highly luminescent when irradiated with light when sensing temperatures, and since Huston teaches that luminescent semiconductor nanocrystals are useful as temperature sensors.

Referring to claims 15-17, 20, 22, and 23, Gouterman discloses a temperature sensor comprising:

a matrix formed of a fluorescent material (B) in an inorganic polymer binder;

a light source arranged to illuminate the material with a first wavelength of light (380nm); and

a detector arranged to detect the intensity of a second wavelength of light (650nm ±20 nm) emitted from the material, wherein the second wavelength is longer than the first wavelength (see column 8, line 28-column 9, line 1; column 9, lines 42-64).

Gouterman does not disclose the fluorescent material being a group II-VI, III-V, or IV semiconductor nanocrystal from the claimed group of nanocrystals; the nanocrystal having a second semiconductor nanocrystal overcoated thereon; the nanocrystal including a metal alkoxide as an organic or organometallic overlayer to make the nanocrystal soluble in the binder; and the nanocrystal being a member of a substantially monodisperse core population.

Huston discloses a temperature sensor comprising a semiconductor nanocrystal. Huston teaches that semiconductor nanocrystals are luminescent when irradiated with light and are useful for sensing temperature.

Bawendi discloses a fluorescent material comprising a semiconductor nanocrystal that is luminescent when irradiated with an excitation wavelength of light. The semiconductor nanocrystal includes a semiconductor, such as CdS, CdSe, or CdTe surrounded by an overcoat of a second semiconductor material. A coat of an organic or inorganic overlayer surrounds the nanocrystal, the overlayer having a polymerizable moiety that has an affinity for the nanocrystal surface and a chosen binder such as an inorganic or organic polymer. The overlayer is used to convey solubility in order to disperse the coated nanocrystal into the chosen binder. The semiconductor nanocrystal is a member of a monodisperse core population. Bawendi teaches that the semiconductor nanocrystal is a highly luminescent material when irradiated with light (column 2, line 47-column 3, line 9, and column 10, line 64-column 11, line 3).

Referring to claim 15, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the sensor disclosed by Gouterman by replacing the fluorescent material with an inorganic polymer-soluble fluorescent material, as taught by Bawendi, in order to provide a fluorescent material that is highly luminescent when irradiated with light when sensing temperatures, and since Huston teaches that luminescent semiconductor nanocrystals are useful as temperature sensors.

Referring to claims 24-26, 30, and 31, Gouterman discloses a temperature-sensing layer comprising a matrix formed of a fluorescent material (B) in an inorganic polymer binder.

Gouterman does not disclose the fluorescent material being a group II-VI, III-V, or IV semiconductor nanocrystal from the claimed group of nanocrystals; the nanocrystal having a second semiconductor nanocrystal overcoated thereon; the nanocrystal including an organic or organometallic overlayer to make the nanocrystal soluble in the binder; and the nanocrystal being a member of a substantially monodisperse core population.

Huston discloses a temperature sensor comprising a semiconductor nanocrystal. Huston teaches that semiconductor nanocrystals are luminescent when irradiated with light and are useful for sensing temperature.

Bawendi discloses a fluorescent material comprising a semiconductor nanocrystal that is luminescent when irradiated with an excitation wavelength of light. The semiconductor nanocrystal includes a semiconductor, such as CdS, CdSe, or CdTe surrounded by an overcoat of a second semiconductor material. A coat of an organic or inorganic overlayer surrounds the nanocrystal, the overlayer being chosen so that it has an affinity for the nanocrystal surface and a chosen binder such as an inorganic or organic polymer. The overlayer is used to convey solubility in order to disperse the coated nanocrystal into the chosen binder. The semiconductor nanocrystal is a member of a monodisperse core population. Bawendi teaches that the semiconductor nanocrystal is a highly luminescent material when irradiated with light (column 2, line 47-column 3, line 9, and column 10, line 64-column 11, line 3).

Referring to claim 24, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the layer disclosed by Gouterman by replacing the fluorescent material with an inorganic polymer-soluble fluorescent material, as taught by Bawendi, in order to provide a fluorescent material that is highly luminescent when irradiated

with light when sensing temperatures, and since Huston teaches that luminescent semiconductor nanocrystals are useful as temperature sensors.

Referring to claims 32-36 and 38-42, Gouterman discloses a temperature-sensing paint comprising a fluorescent material (B) in an inorganic polymer binder and a deposition solvent including an alcohol. The paint has a pressure-sensitive composition (A) including a platinum porphyrin that emits light dependent upon oxygen pressure when irradiated by an excitation wavelength of light.

Gouterman does not disclose the fluorescent material being a group II-VI, III-V, or IV semiconductor nanocrystal from the claimed group of nanocrystals; the nanocrystal emitting light independent of oxygen pressure and dependent upon temperature upon irradiation by an excitation wavelength of light; and the nanocrystal being a member of a substantially monodisperse core population.

Huston discloses a temperature sensor comprising a semiconductor nanocrystal. Huston teaches that semiconductor nanocrystals are luminescent when irradiated with light and are useful for sensing temperature.

Bawendi discloses a fluorescent material comprising a semiconductor nanocrystal that is luminescent when irradiated with an excitation wavelength of light. The semiconductor nanocrystal includes a semiconductor, such as CdS, CdSe, or CdTe surrounded by an overcoat of a second semiconductor material. A coat of an organic or inorganic overlayer surrounds the nanocrystal, the overlayer being chosen so that it has an affinity for the nanocrystal surface and a chosen binder such as an inorganic or organic polymer. The overlayer is used to convey

solubility in order to disperse the coated nanocrystal into the chosen binder. The semiconductor nanocrystal is a member of a monodisperse core population. Bawendi teaches that the semiconductor nanocrystal is a highly luminescent material when irradiated with light (column 2, line 47-column 3, line 9, and column 10, line 64-column 11, line 3).

Referring to claim 32, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the paint disclosed by Gouterman by replacing the fluorescent material with an inorganic polymer-soluble fluorescent material, as taught by Bawendi, in order to provide a fluorescent material that is highly luminescent when irradiated with light when sensing temperatures, and since Huston teaches that luminescent semiconductor nanocrystals are useful as temperature sensors.

Referring to claim 33, the semiconductor nanocrystal of Bawendi inherently emits light independent of oxygen pressure.

Referring to claims 43 and 44, Gouterman discloses a method of manufacturing a temperature-sensing paint by combining a fluorescent material (B), a binder, and a deposition solvent to form the paint.

Gouterman does not disclose the fluorescent material being a semiconductor nanocrystal that is prepared by contacting an M donor, M being Cd, Zn, Mg, Hg, Al, Ga, In, or Tl, with an X donor, X being O, S, Se, Te, N, P, As, or Sb, to form a mixture, and heating the mixture to form the nanocrystal.

Huston discloses a temperature sensor comprising a semiconductor nanocrystal. Huston teaches that semiconductor nanocrystals are luminescent when irradiated with light and are useful for sensing temperature.

Bawendi discloses a fluorescent material comprising a semiconductor nanocrystal that is luminescent when irradiated with an excitation wavelength of light. The semiconductor nanocrystal includes a semiconductor, such as CdSe. The semiconductor nanocrystal is prepared by contacting a Cd donor with an Se donor to form a mixture, and heating the mixture to form the nanocrystal. Bawendi teaches that the semiconductor nanocrystal is a highly luminescent material when irradiated with light (column 2, line 47-column 3, line 9; column 6, lines 5-25; column 8, line 66-column 9, line 67; and column 10, line 64-column 11, line 3).

Referring to claim 43, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method disclosed by Gouterman by replacing the fluorescent material with a fluorescent material prepared as taught by Bawendi, in order to provide a fluorescent material that is highly luminescent when irradiated with light when sensing temperatures, and since Huston teaches that luminescent semiconductor nanocrystals are useful for sensing temperature.

Referring to claims 45-47, Gouterman discloses a method of manufacturing a temperature sensor by depositing a temperature-sensing paint on a surface of a substrate, the paint comprising a fluorescent material (B) in a binder and a deposition solvent.

Gouterman does not disclose the fluorescent material being a group II-VI, III-V, or IV semiconductor nanocrystal from the claimed group of nanocrystals.

Huston discloses a temperature sensor comprising a semiconductor nanocrystal. Huston teaches that semiconductor nanocrystals are luminescent when irradiated with light and are useful for sensing temperature.

Bawendi discloses a fluorescent material comprising a semiconductor nanocrystal that is luminescent when irradiated with an excitation wavelength of light. The semiconductor nanocrystal includes a semiconductor, such as CdS, CdSe, or CdTe surrounded by an overcoat of a second semiconductor material. A coat of an organic or inorganic overlayer surrounds the nanocrystal, the overlayer being chosen so that it has an affinity for the nanocrystal surface and a chosen binder such as an inorganic or organic polymer. The overlayer is used to convey solubility in order to disperse the coated nanocrystal into the chosen binder. Bawendi teaches that the semiconductor nanocrystal is a highly luminescent material when irradiated with light (column 2, line 47-column 3, line 9, and column 10, line 64-column 11, line 3).

Referring to claim 45, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method disclosed by Gouterman by replacing the fluorescent material with a fluorescent material as taught by Bawendi, in order to provide a fluorescent material that is highly luminescent when irradiated with light when sensing temperatures, and since Huston teaches that luminescent semiconductor nanocrystals are useful as temperature sensors.

3. Claims 8, 21, 29, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gouterman, Huston, and Bawendi, as applied to claims 1-3, 6, 7, 9-17, 20, 22-26, 30-36, and 38-

48 above, and further in view of the prior art disclosed by applicant on page 8, lines 28 and 29 of the specification [hereinafter Prior Art].

Gouterman, Huston, and Bawendi disclose a method, sensor, layer, and paint having all of the limitations of claims 8, 21, 29, and 37, as stated above in paragraph 2, except for the binder including an organic polymer.

The Prior Art teaches that it is known to use either an organic or an inorganic polymer as a binder in paint.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method, sensor, layer, and paint disclosed by Gouterman, Huston, and Bawendi by replacing the inorganic polymer with an organic polymer, since the Prior Art teaches that these polymers are alternate and equivalent polymers known to be used in paint.

Response to Arguments

4. Applicant's arguments that Huston fails to describe temperature measurement using photoluminescent emission, i.e., by using an excitation light, since he describes measuring temperature using thermoluminescent emission, i.e., by using a heating source such as electrical, thermochemical, inductive, or ultrasonic heaters, are not persuasive since the excerpt in which Applicant relies (column 13, line 63-column 14, line 5) states that "temperature measurement can be done optically", 'optically' meaning using excitation light since Eu is an element that is made luminescent by applying an excitation light. Therefore, Huston describes temperature measurement using photoluminescent emission, i.e., by using an excitation light.

5. Applicant's arguments that the rejections over the Prior Art disclosed by Applicant are improper because the Examiner has not taken into account only knowledge which was within the level of ordinary skill in the art at the time the invention was made and includes knowledge gleaned only from applicant's disclosure are not persuasive since the prior art disclosed by applicant is that paint compositions typically use polymers or prepolymers, wherein 'typically' is synonymous with: general, common, commonplace, matter-of-course, natural, normal, prevalent, regular, typic, usual (see Merriam-Webster's Dictionary, 10th ed.), i.e., applicants states that polymers or prepolymers are components commonly used in paint compositions. A person having ordinary skill in the art at the time the invention was made would have known that polymers are used in paint compositions, therefore the prior art used by the Examiner is not knowledge gleaned only from Applicant's disclosure of his own invention, but Applicant's disclosure of prior art.

6. The Declaration under 37 CFR 1.132 filed 12/17/04 has been considered, but is moot since the Amendment filed 12/17/04 has overcome the rejections over Huston, and Huston in view of Bawendi.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mirellys Jagan whose telephone number is 571-272-2247. The examiner can normally be reached on Monday-Friday from 11AM to 4PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on 571-272-2245. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MJ
March 5, 2005

G. Verbitsky

GAIL VERBITSKY
PRIMARY EXAMINER